Partnering with DOE to Apply Advanced Biological, Environmental, and Computational Science to Environmental Issues

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On February 18, 2004, the U.S. Environmental Protection Agency and Department of Energy signed a Memorandum of Understanding to expand the research collaboration of both agencies to advance biological, environmental, and computational sciences for protecting human health and the environment and fostering a secure, reliable, and economically sustainable energy system. This poster will describe three areas of collaboration: gene sequencing, high-performance computing, and decision tools for sustainability.

Using approaches derived from modern computational methods, medicinal chemistry, molecular biology, and systems biology, computational biology allows us to address the questions of "when and how" to test specific chemicals for hazards and for improving quantitative risk assessments of chemicals and microbial human pathogens. Gene sequencing holds the potential to reveal molecular pieces of the toxicity pathway, which is critical to answering these questions. This is particularly important for submammalian species, for which such information lags considerably behind mammals. The collaboration between EPA and DOE will produce DNA sequence data on organisms of special importance to EPA's effort to apply molecular data to the prediction of toxicity, characterization of exposure and, ultimately, integration in ecological risk assessments.

The forward-looking relationship between EPA and DOE is also characterized by high-performance computing, a key area of collaboration that will take computational sciences and decision-making tools to a new level of sophistication and utility. High-performance computing allows optimization (better, faster, cheaper runs) of environmental models such as EPA's Community Multi-Scale Air Quality (CMAQ) model, enhances data storage and transfer of large data sets, and reduces data duplication. Optimization is targeted to systems used by state and regional agencies that must meet upcoming deadlines on air quality implementation plans in the 2007-2008 time frame. As EPA and DOE's scientists explore new research areas, high-performance networking will enable more thorough and rapid analysis of large datasets.

DOE and EPA's collaborative efforts in the area of sustainability will focus on a variety of research tools and modeling activities that contribute to informed decisions and policies in environmental protection, development of new environment and energy technology, sustainable energy use, ecological monitoring, analysis of material flows, and environmental and facilities cleanup.